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WATERPROOFED AND VENTILATED ITEM OF FOOTWEARDESCRIPTION5 **TECHNICAL FIELD**

The present invention generally relates to the technical field of footwear, and particularly an item of footwear featuring some important improvements in relation to the ability of allowing the perspiratory moisture given off from the feet to pass through an outsole of the footwear which is specifically designed to this purpose, while ensuring at the same time an effective ~~waterproofness~~ *water-repellency*.

**BACKGROUND ART**

There are known in the art items of footwear which comprise an outsole made from a soling material such as rubber, or a compound mixed with rubber, or also polyurethane or polyvinyl chloride. Such soling materials used in the production of outsoles are capable of providing protection, traction, durability, waterproofness and play also a role in flexibility, stability and cushioning.

However, the outsoles made from such materials suffer from an important disadvantage by not being permeable to the moisture which perspires from the plantar of the feet. Since the perspiration moisture can scarcely move away from the outsole of the footwear, it combines with the darkness and the warmth inside the footwear to create a fertile breeding ground for the fungi and bacteria that normally live on our skin. The

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decomposition of outer layers of the skin operated by the fungi and bacteria produces isovaleric acid which is associated with the typical foul foot odor. Moreover, if the perspiration moisture is not adequately removed from the footwear, the skin of the feet macerates and even mild friction in the footwear can cause painful blisters to appear on the skin of the feet.

To overcome this drawback and maintain the environment inside the footwear as dry and healthy as possible, attempts have been made in order to allow the perspiratory moisture given off from the feet to breathe not only through the upper of the footwear, but also through the outsole of the footwear in order to vent the moisture and cool the inside of the footwear.

Document EP 0 121 645 B1 concerns an item of footwear aimed at solving this technical problem. In particular, the footwear described in this document comprises a rubber outsole with holes distributed therethrough which are closed by small leather inserts arranged on the side intended to face the upper of the footwear. These leather inserts are glued and/or fixed into the holes with a suitable adhesive. The footwear is also provided with an insole made of cork.

According to EP 0 121 645 B1, the object of the through holes distributed in the outsole of the footwear is to provide perspiration of moisture through the outsole. However, also the footwear disclosed in EP 0 121 645 B1 suffers from some disadvantages, specifically in relation to its manufacturing process and to its ability to ensure a durable breathability and waterproofness.

As regards the process for manufacturing such a footwear, this process should comprise at least a first step for producing the perforated

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outsole, a second step for gluing the leather inserts into the holes made through the outsole and a third step for attaching the insole and the upper to the top side of the outsole. A manufacturing process of this kind is rather inefficient, and moreover the quality of the footwear thereby produced does not meet the high standards which are demanded in footwear at the present time.

In relation to the waterproofness of a footwear of this kind, it has been found that the leather inserts which are glued into the holes provided in the outsole of the footwear can become detached from the outsole upon repeated bending of the outsole during the normal use of the footwear. Thus, under rainy weather conditions water from the outside ambient can penetrate the footwear through the holes and cause great discomfort. Moreover, no means is provided for imparting a *degree of water-repellency* ~~level of waterproofness~~ to the leather inserts which are inherently hydrophilic and in a short time tend to absorb and transmit liquid water, specially in the case the outsole of footwear contacts a wet or muddy ground.

In connection with the breathability of the footwear of the kind known in the art, a major drawback consists in that, eventually, the holes made in the outsole become clogged with dirt and mud, thus they are no more capable of venting the moisture given off in perspiring from the feet. This drawback becomes apparent specially in the case the footwear is intended for use in leisure time and/or sport activities, during which it often occurs that the outsole touches a dirty or muddy ground.

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Also document WO 97/28711A addresses the task of developing a breathable outsole for both normal and watertight footwear. According to this document the outsole is formed of two layers with an elastic and water vapour-permeable inner layer and an outer layer which covers less than 70% of the inner layer.

However, the use of a footwear having such an outsole construction is rather uncomfortable because the outsole is not capable of providing stability, traction and cushioning action, especially in the case the footwear is intended for leisure time and/or sport activities. Moreover, the manufacturing process of the outsole disclosed in WO 97/28711 A is rather inefficient and expensive.

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## DISCLOSURE OF THE INVENTION

It is therefore an object of the present invention to provide an item of footwear intended for leisure time and/or sport activities which is improved in relation to its breathability and <sup>water-repellency</sup> ~~waterproofness~~.

5 Accordingly, this object is achieved with an item of footwear comprising in combination:

- an outsole <sup><consisting in a monolithic piece of synthetic material and</sup> having in its forepart at least a vent opening which is made through the thickness of said outsole,
- a grating-like element which is set into said vent opening and acts as a screen by separating and protecting the inside of the footwear from the ground which comes into contact with said outsole,
- a pliable sheet insert made from a breathable and <sup>water-repellent leather</sup> ~~waterproofed~~ material which is embedded into the outsole and is positioned inside the outsole so as to overlie said vent opening,
- an insole made of a breathable and <sup>water-repellent leather, leatherboard or fibre board</sup> ~~waterproofed~~ material, and
- an upper made of a breathable and <sup>water-repellent leather</sup> ~~waterproofed~~ material.

## BRIEF DESCRIPTION OF DRAWINGS

The features of the present invention will appear in the course of the following description of an embodiment thereof chosen by way of example and illustrated with reference to the accompanying drawings, in which:

Figure 1 is a plan view of the bottom surface with the tread pattern of the outsole of the item of footwear according to the present invention;

Figure 2 is a longitudinal section view of the footwear according to the present invention taken along line A-A of Figure 1; and

Figure 3 is a cross section view of the footwear according to the present invention taken along line B-B of Figure 1.

## 5 BEST MODE OF CARRYING OUT THE INVENTION

Referring to Figs. 1-3 of the drawings, there is shown the item of footwear according to the present invention, generally designated by 10. The footwear comprises, in a manner known per se, an outsole 11 which is produced by injection moulding and is made of a suitable soling material such as rubber or a compound mixed with rubber, or also polyurethane or polyvinyl chloride.

The outsole 11 is provided in its forepart with at least one large vent opening 12 which is made through the thickness of the outsole 11. In each vent opening 12 a grating-like element 13 is set which acts as a screen by separating and protecting the inside of the footwear from the ground contacted by the tread of outsole 11. The grating-like element 13 is formed of juxtaposed straight or curved, parallel or latticed bar elements 14 which are preferably integral with the outsole 11 and are produced together therewith by injection moulding. Alternatively, the bar elements 14 of the grating-like element 13 are integral with an insert (not shown) which is adapted to be inserted into the vent opening 12 and fixed therein.

The length and width of the vent openings 12 provided in the outsole 11 are chosen so that any dirty or muddy ground matter which may contact the outsole 11 and enter the vent openings 12 is readily removed therefrom by the natural occurring bending movement of the outsole 11 when one

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walks or runs. Therefore, the possibility that the vent openings 12 become clogged by the ground matter is reduced to a minimum.

The outsole 11 includes a pliable sheet insert 15 which is made from a suitable breathable and <sup>water-repellent</sup> ~~waterproofed~~ material and is embedded into the outsole 11. The sheet insert 15 has a thickness preferably ranging from 2 to 3 mm. To ensure the breathability of the footwear, the sheet insert 15 is positioned inside the outsole 11 so as to overlie the vent openings 12 as shown particularly in Figs. 2 and 3 of the drawings. The sheet insert 15 is protected from wear and damage by the screening action of the grating-like elements 13.

As mentioned above, the material of the sheet insert 15 is selected among breathable and <sup>water-repellent</sup> ~~waterproof~~ materials which are available in the art of footwear manufacturing. Preferably, the material used for the sheet insert 15 is <sup>water-repellent</sup> ~~waterproofed~~ leather, i.e. leather which has been treated so as to improve its repellency to water.

<sup>Leather is made water-repellent by means of</sup>  
~~Waterproofing of leather is~~ a process known in the art by which the leather is coated with a protective hydrophobic, i.e. water repellent compound which is formulated so as to have no effect on the natural breathability of the leather. This protective coating can be applied to leather at the tannery during the tanning process and the leather produced thereby is capable of resisting absorption and transmission of liquid water. Moreover, such treated leather has a greater strength and durability than other known synthetic breathable and waterproof materials which are adapt to be used in footwear manufacturing. The use of leather is also advantageous because, as

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a natural material, leather is more effective in allowing perspiration moisture to breathe than other known synthetic materials.

5 The pliable sheet insert 15 is fixed firmly into position inside the outsole 11 when this is produced by injection moulding. By this means, the outsole 11 is produced together with the sheet insert 15 embedded therein in only one step and no further gluing step of the sheet insert 15 in the outsole 11 is required. Thus, the process for manufacturing the footwear is more energy and cost efficient than those required for producing other known footwear of this kind. Furthermore, an item of footwear exhibiting a higher  
10 quality can be produced because the sheet insert 15 is sealed along its border to the outsole 11, thereby ensuring a durable watertight closure along the border of the vent openings 12.

The item of footwear according to present invention comprises also an insole 16 to which the upper 17 is attached by a stitching seam, f.i. with a  
15 Strobel working method, and then the insole 16 together with the upper 17 is attached to the outsole 11 in a manner known in the art of footwear manufacturing.

The insole 16 is preferably made of a breathable and ~~waterproofed~~ <sup>water-repellent</sup> leather, leatherboard or fibreboard, and is flexible and able to absorb the  
20 moisture given off in perspiring from the feet. Other suitable materials for the insole 16 are ethylene vinyl acetate, polyesters, thermoplastics, graphite, and foam polymers which may add cushioning and support to moisture control. In fact, as shown in Figs. 2 and 3 of the drawings, the insole 16 is provided with through holes 18 located in its forepart which aid to moisture

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breathability of the insole. The insole 16 has a thickness generally in the range of 1.8-2.0 mm.

The insole 16 may be suitably covered by an insock 19 to conceal any stitches which may protrude. The insock 19 is preferably formed of layers of different materials joined together by a stitching seam. The insock 19 comprises at least a top layer made of leather which is joined to a bottom layer made of ethylene vinyl acetate. The insock 19 is also provided with a heel cushioning pad 20 located in its back part which may be integral with the bottom layer and protrude through an opening in the top layer in order to contact the heel portion of the feet. Alternatively, the heel cushioning pad 20 may be a separate pad which is attached to the top layer of the insock 19 and is filled inside with a gel-like padding material. The insock 19 is also provided with through holes 21 located in its forepart which aid to moisture breathability of the insock.

The upper 17 of the item of footwear 10 is made from a <sup>water-repellent</sup> ~~waterproof~~ and breathable material such as <sup>water-repellent</sup> ~~waterproofed~~ leather or a combination of materials such as <sup>water-repellent</sup> ~~waterproofed~~ leather, foam polymers and nylon or polyester mesh bonded together in a laminated form and capable of ensuring in combination breathability and <sup>water-repellency</sup> ~~waterproofness~~ to the upper.

From the foregoing it can be readily understood that the item of footwear according to the present invention obviates the drawbacks of other similar footwear known in the art. In fact, the item of footwear of the invention can be produced with a more efficient manufacturing process which requires a less number of steps. Furthermore, the item of footwear of the invention permits an optimum ventilation inside the footwear to be

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achieved which maintains the environment around the feet cool, dry and  
healthy by the use of high performance breathable and <sup>water-repellent</sup> ~~waterproofed~~ leather  
and synthetic materials in combination with a novel outsole construction.

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AMENDED SHEET